Project Report

ENDANGERED SPECIES MONITORING

Mississippi River-Gulf Outlet
Bar Channel
Maintenance Dredging
05-1-MRGO

Operations Technical Support Branch
US Army Corps of Engineers
New Orleans District
504-862-2521

INTRODUCTION

This report is submitted in fulfillment of requirements of the Endangered Species Act (ESA) and the Section 7 Consultation - Biological Opinion concerning Dredging of Gulf of Mexico Navigation' Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by U.S. Army Corps of Engineers Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/0l287) dated November 19, 2003. The U.S. Army Corps of Engineers, New Orleans District (MVN) submits this report, in compliance with reasonable and prudent measure No. 9 – Reporting, summarizing the results of Fiscal Year (FY) 2005 maintenance dredging of the Mississippi River-Gulf Outlet (MR-GO), Louisiana, bar channel by hopper dredges following the passage of Hurricane Ivan.

The passage of Hurricane Ivan on September 16, 2004, resulted in unexpected, severe shoaling in discontinuous segments of the MR-GO navigational channel. Prior to the hurricane, the Mile –5.4 to Mile –8.8 bar channel reach was characterized by bottom elevations of about –37 feet Mean Low Gulf (MLG). Surveys in this same reach following the passage of Hurricane Ivan revealed bottom elevations as shallow as –24 feet MLG. The authorized dimensions of the MR-GO bar channel are 38 feet deep by 600 feet wide. Several container vessels were immediately rerouted to Houston as a result of this channel blockage.

Several factors resulted in MVN utilizing primarily hopper dredges instead of cutterhead dredges to perform post-hurricane maintenance dredging in the MR-GO bar channel.

1. During September 2004, the last month of FY 2004, there was insufficient funding available to award a cutterhead dredge contract to perform the post-hurricane work. The available funding was, however, sufficient to fund a hopper dredge contract to immediately begin performance of this maintenance work. When FY 05 funding became available for MR-GO maintenance, a second hopper dredging contract was awarded based on the reasons provided below.

2. The need to quickly re-establish a deep draft navigational channel in the aftermath of Hurricane Ivan's passage required a high production rate. Although cutterhead dredges generally have a higher production rate than hopper dredges, primarily because of the non-dredging transit time for the hopper dredge to go from the dredging site to the dump site, their production rate for working in the MR-GO bar channel during the fall/winter period would be lower than that of a hopper dredge due to frequent extended work stoppages as they waited for rough sea conditions to abate. Even the largest cutterhead dredges working in the MR-GO bar channel during the fall/winter period would experience such work stoppages.

3. Rough fall/winter sea conditions also would create a dangerous working environment for cutterhead dredges, which are not designed to operate in open-sea conditions, are anchored in place to work, and cannot sail like hopper dredges to avoid rough sea conditions. The pipelines used to transport the dredged material to the placement sites would be highly susceptible to breakage during rough weather. Even in relatively sheltered bays, cutterhead dredges often stop dredging in rough weather and during frontal passages. During these periods, only water is

pumped to keep tension on the pipelines to prevent breaking. In the open Gulf of Mexico, this precaution would not be effective, even if it were possible to leave the dredge offshore.

Following the receipt of Supplemental Funding in the aftermath of Hurricane Ivan's passage, a cutterhead dredge contract for performing maintenance dredging in the MR-GO Mile 3.4 to Mile –4.0 reach was awarded in December 2004. This cutterhead dredge work was to address the next most critical channel depth deficiency in the MR-GO, building upon the hopper dredge work both previously performed and on-going.

DREDGING

Because of the critical need to quickly re-establish a navigational channel with sufficient depth and width to allow at least one-way vessel traffic, the MR-GO bar channel was not excavated to full channel dimensions. A channel of reduced dimensions, or pilot cut, was constructed by hopper dredges through the bar channel portion most severely shoaled in by the hurricane's passage (Figure 1). A total of seven hopper dredges were employed in this post-hurricane maintenance effort in the MR-GO bar channel between September 24, 2004, and February 16, 2005. The majority of this work was performed with multiple hopper dredges working simultaneously in the MR-GO bar channel (Figure 2).

The Pilot Cut

On September 24, 2004, hopper dredging work on the Mile –3.8 to Mile –8.4 MR-GO bar channel reach began. The required depth of dredging for this pilot cut was –38 feet MLG over a width of 300 feet. All work was performed in the dredge and haul mode with disposal into the ocean dredged material disposal site (ODMDS). Hopper dredging operations on the MR-GO bar channel were completed on February 16, 2005.

TURTLE MONITORING PROGRAM

A result of the ESA consultation process was the requirement to document turtle takes by the dredges. In order to accomplish this task, hopper dredges were equipped such that all inflows and overflows would be appropriately screened prior to the commencement of dredging operations. The configuration and location of the screens was dependent upon the construction of the dredge. The starting mesh size of this screening is 4-inches by 4-inches. Additionally, around-the-clock monitoring by National Marine Fisheries Service-approved turtle observers was conducted to identify any turtles or turtle parts that were caught on these screens. Draghead deflectors were also deployed to deflect any turtles that may happen to be in, or near, the path of the draghead during excavation. The design of the deflectors is such that a sediment riffle is created ahead of the draghead, cushioning any contact with turtles thereby preventing injuries.

The observers were employed by ECOES Consulting, REMSA Inc., and Coastwise Consulting, Inc. under subcontracts to dredging contractors, Great Lakes Dredge & Dock, Bean, and Manson Construction Company. The observers inspected and cleaned all inflow and

overflow screening at the end of each load. Dragheads and deflectors were also inspected immediately after each load, and dredge personnel were informed if repairs were necessary. Data sheets were completed daily, detailing all biological samples and debris found in the screening and dragheads. The observers also recorded the start, end and discharge times for each load, the specific location of the dredging area, the type of material being dredged, weather, tide and water temperature data, the condition of the screening, and any other pertinent information. Any sea turtle encounters or takes were described on a separate incident report form. Additionally, all incidents were photographed and diagrams were made of the specimen sampled. Dead specimens were frozen until all concerned parties were notified. Specimens were then disposed of at the dredged material placement site to ensure that a dredge would not take these same samples again.

Sea turtle relocation trawling was performed for this maintenance work from October 11, 2004, though February 16, 2005, when hopper dredging operations were completed. A minimum of 2, and a maximum of 3, relocation trawlers were at work in the MR-GO bar channel during this period except when weather conditions prevented trawlers from working. During these times when relocation trawlers were unable to work, hopper dredges also did not work.

In 2003, and previous years, the National Marine Fisheries Service determined that listed whales are unlikely to be adversely affected by hopper dredging in the Gulf of Mexico. As a result, endangered species monitors for whales, bridge observers, were not required for this contract. A bridge watch for sea turtles and marine mammals was maintained during all daylight hours, except when the observer was off the bridge, cleaning and inspecting the screens and dragheads. All sightings of sea turtles and cetaceans were recorded in a bridge watch logbook.

Throughout the maintenance event, dredging operations were conducted following the items listed in reasonable and prudent measures 4 through 8. This included advising the Contractor of the potential presence of sea turtles in the navigation channel and reporting and operating requirements.

DEFLECTOR & SCREEN CONFIGURATIONS

Turtle monitoring activities were conducted aboard seven different hopper dredges during this MR-GO post-Hurricane Ivan maintenance work (Figure 1). These were the WHEELER, MANHATTAN ISLAND, NEWPORT, EAGLE I, STUYVESANT, BAYPORT, and PADRE ISLAND. Each of these vessels was required to have rigid draghead deflectors, and 100% inflow screening or overflow screening with openings starting at 4" x 4."

WHEELER

The government hopper dredge WHEELER began its work in the MR-GO bar channel on September 24, 2004, and finished on October 14, 2004. During this period, the dredge worked a total of 16 days on the MR-GO. A total of 199 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –6.3 and –8.0.

The WHEELER excavated a total of 474,296 CY of material from this project. ECOES Consulting observers were employed for all work on this dredge. Additional information regarding the WHEELER's work was provided in a November 19, 2004, report to your agency.

The WHEELER employed up to three dragheads (California type deflectors) throughout its work, although the majority of work was performed using the two side dragarms only. No major problems with deflector operating conditions were experienced. Inflow screening used in this work was maintained at 100 percent effectiveness.

During this maintenance event there were no documented incidental sea turtle takes. However, a portion of a green sea turtle carapace was recovered in the screens on September 30, 2004. This was not categorized as an incidental take as the observers noted, based on the condition of the remains, that it had likely been dead prior to the start of the maintenance dredging effort. Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included redfish, weakfish, stingrays, conch shells, crabs, skates, and squid tentacles. The majority of the non-biological debris consisted of wood, plastic, scrap metal, wire cable, netting, one leather boot, concrete, rubber material, one small wheel, and one roll of duct tape.

A sea turtle was sighted on September 28, 2004, but could not be positively identified (the observer believes it to have been either a loggerhead or green sea turtle). On October 2, 2004, a loggerhead sea turtle was sighted. Another loggerhead sea turtle was sighted on October 5, 2004.

Below mid-depth water temperatures were not measured. Surface water temperatures consistently measured 82.0° F (27.7°C).

MANHATTAN ISLAND

The MANHATTAN ISLAND performed work in the MR-GO bar channel under contract W912P8-04-C-0056. Dredging began on September 29, 2004, and was completed on January 13, 2005. During this period, the dredge worked a total of 69 days on the MR-GO. A total of 372 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –0.9 and –8.0. The MANHATTAN ISLAND excavated a total of 844,833 CY of material from this project. REMSA, Inc. observers were employed for all work on this dredge.

The MANHATTAN ISLAND employed two dragheads (Universal-type deflectors) throughout its work. On October 3, 2004, the port draghead lost its 8" by 8" grating. This grating was never replaced. Draghead deflector chains were broken on both port and starboard deflectors on October 18-19, 2004, and repairs were never completed. Initially, the inflow screening doors were not functioning properly, and unacceptable gaps existed between the closed doors and the screening boxes. The start of work was delayed while these deficiencies underwent repairs. Even after repairs had been completed and work began, some gapping

remained such that the inflow screens were only operating at about a 75 percent efficiency level. Overflow screening was used to augment and partially compensate for the reduced inflow screening efficiency. Inflow screening was not totally repaired until October 11, 2004. On November 6, 2004, the dredge encountered an unidentified obstruction on the channel bottom that completely knocked off the portside draghead deflector. The portside draghead was not used again until a replacement deflector was installed.

Incidental takes of loggerhead sea turtles occurred on October 22, 2004, November 3, 2004, and November 13, 2004. All takes were recovered from the port draghead inflow screens. On December 7, 2004, the partial remains of a loggerhead sea turtle that had been recorded as an incidental take by the NEWPORT was recovered in the MANHATTAN ISLAND screens. On November 4, 2004, observers working on the dredge sighted two unidentified sea turtles astern. Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included seagrass, stingrays, crabs, shell, and a variety of fish. The majority of the non-biological debris consisted of wood, plastic, wire, and netting.

Below mid-depth water temperatures were only recorded from October 12 through October 26 and ranged from a maximum high of 78.8° F (26.0°C) to a minimum low of 75.2° F (24.0°C). Surface water temperatures were recorded throughout this work and ranged from a maximum high of 81.0° F (27.2°C) to a minimum low of 60.0° F (15.6°C).

NEWPORT

The NEWPORT performed work in the MR-GO bar channel under contracts W912P8-04-C-0056 and W912P8-04-C-0057. Dredging began on September 25, 2004, and was completed on December 7, 2004. During this period, the dredge worked a total of 50 days on the MR-GO. A total of 412 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –4.5 and –7.5. A total of 890,951 CY of material were excavated from this project by the NEWPORT. Coastwise Consulting, Inc. observers were employed for all work on this dredge.

The NEWPORT employed two dragheads (split toe type deflectors) throughout its work. Both inflow and overflow screens were used.

Incidental takes of loggerhead sea turtles occurred on October 3, 2004, October 16, 2004, October 19, 2004, and December 6, 2004 (two loggerheads on this day). Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included seagrass, stingrays, blue crabs, gastropods, bivalves, a variety of fish, and shell. The majority of the non-biological debris consisted of wood, plastic, scrap metal, wire cable, line, and netting.

Below mid-depth water temperatures were not measured. Surface water temperatures ranged from a maximum high of 84.2° F (29.0°C) to a minimum low of 63.0° F (17.2°C).

EAGLE I

The EAGLE I performed work in the MR-GO bar channel under contract W912P8-04-C-0057. Dredging on the MR-GO was performed between October 1 - 21, 2004, November 17 – December 7, 2004, and February 5 – 16, 2005. The dredge worked a total of 51 days on the MR-GO. A total of 372 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –4.0 and –7.0. A total of about 1,017,321 CY of material were excavated from this project by the EAGLE I. Coastwise Consulting, Inc. observers were employed for all work on this dredge.

The EAGLE I employed two dragheads (IHC Visor type deflectors) throughout its work. Only inflow screens were used.

Incidental takes of loggerhead sea turtles occurred on October 6, 2004, October 7, 2004, October 12, 2004, and November 30, 2004. A Kemp's ridley sea turtle was sighted outside of the channel on October 17, 2004. Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included seagrass, crabs, whelks, marsh grass, stingrays, gastropods, bivalves, and a variety of fish. The majority of the non-biological debris consisted of wood, plastic, metal, wire, netting, and line.

Below mid-depth water temperatures were recorded intermittently and ranged from a maximum high of 80.0° F (26.7°C) to a minimum low of 62.0° F (16.7°C). Surface water temperatures ranged from a maximum high of 81.0° F (27.2°C) to a minimum low of 55.0° F (12.8°C).

BAYPORT

The BAYPORT performed work in the MR-GO bar channel under contract W912P8-04-C-0057. Dredging began on October 31, 2004, and was completed on November 19, 2004. During this period, the dredge worked a total of 20 days on the MR-GO. A total of 121 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –4.0 and –7.5. A total of 320,725 CY of material were excavated from this project by the BAYPORT. Coastwise Consulting, Inc. observers were employed for all work on this dredge.

The BAYPORT employed two dragheads (deflector type unknown) throughout its work. Both inflow and overflow screens were used.

An incidental take of a loggerhead sea turtle occurred on November 8, 2004. The decomposed remains of a loggerhead sea turtle were recovered on November 17, 2004 (this was determined not to be an incidental take). Remains of a loggerhead sea turtle taken by another hopper dredge were recovered on November 19, 2004. Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included seagrass, stingrays, blue crabs, whelks, gastropods, bivalves, and a variety of fish. The

majority of the non-biological debris consisted of wood, plastic, metal, wire, netting, and rope.

Below mid-depth water temperatures were not measured. Surface water temperatures ranged from a maximum high of 78.0° F (25.6°C) to a minimum low of 70.0° F (21.1°C).

STUYVESANT

The STUYVESANT performed work in the MR-GO bar channel under contract W912P8-04-C-0057. Dredging began on December 4, 2004, and was completed on February 1, 2005. During this period, the dredge worked a total of 38 days on the MR-GO. A total of 159 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –6.0 and –7.8. The STUYVESANT excavated a total of 213,760 CY of material from this project. REMSA Inc. observers were employed for all work on this dredge.

The STUYVESANT employed two dragheads (IHC Visor type deflectors) throughout its work. Only inflow screens were used.

No incidental takes of sea turtles occurred during this work. Throughout the dredging work, both biological and non-biological debris were recovered from the screens. Biological material included stingrays, crabs, whelks, starfish, a variety of fish, and pieces of wood. The non-biological debris consisted of debris.

Below mid-depth water temperatures were recorded intermittently and ranged from a maximum high of 65.0° F (18.3°C) to a minimum low of 54.0° F (12.2°C). Surface water temperatures were recorded intermittently and ranged from a maximum high of 66.0° F (18.9°C) to a minimum low of 52.0° F (11.1°C).

PADRE ISLAND

The PADRE ISLAND performed work in the MR-GO bar channel under contract W912P8-04-C-0056. Dredging began on January 13, 2005, and was completed on February 17, 2005. During this period, the dredge worked a total of 32 days on the MR-GO. A total of 140 loads of dredged material were collected and deposited into the ODMDS. Dredging was performed between bar channel miles –4.0 and –5.5. The PADRE ISLAND excavated a total of 155,633 CY of material from this project. REMSA, Inc. observers were employed for all work on this dredge.

The PADRE ISLAND employed two dragheads (Universal type) throughout its work. Both inflow and overflow screens were used (inflow screens were maintained at 100 percent coverage and overflow screens were maintained at 90 percent coverage).

An incidental take of a green sea turtle occurred on January 25, 2005. Remains of an unidentified sea turtle were recovered on January 27, 2005. These sea turtle remains were not categorized as an incidental take. Throughout the dredging work, both biological and non-

biological debris were recovered from the screens. Biological material included seagrass, stingrays, blue crabs, and a variety of fish. The majority of the non-biological debris consisted of wood, plastic, netting, and rope.

Below mid-depth water temperatures were not measured. Surface water temperatures were recorded intermittently and ranged from a maximum high of 64.0° F (17.8°C) to a minimum low of 54.0° F (12.2°C).

SEA TURTLE RELOCATION TRAWLING

On October 6 and 7, the EAGLE I recorded 2 loggerhead sea turtle takes within a 24-hour period. Pursuant to reasonable and prudent measure No. 13 of the November 2003 Biological Opinion, relocation trawling was initiated for hopper dredging activity on the MR-GO bar channel. Coastwise Consulting, Inc. was subcontracted to provide relocation trawling services for both hopper dredging contracts. Relocation trawling began on October 11, 2004, and was conducted on a 24-hour daily basis during dredging operations.

Relocation trawlers performed work in the MR-GO bar channel in different trawler-to-hopper dredge combinations depending upon the prevailing needs and circumstances. From October 11, 2004, through November 18, 2004, two relocation trawlers performed work in the MR-GO bar channel. Trawling work during this period was conducted in association with 2 to 4 hopper dredges simultaneously working in the Mile –3.6 to Mile –8.0 reach. Because of the number of hopper dredges simultaneously working in this MR-GO reach, it was decided that only 2 relocation trawlers would be utilized for safety reasons.

From November 19, 2004, through December 29, 2004, three relocation trawlers performed work in the MR-GO bar channel with only one hopper dredge working. This arrangement came about because of the 12th and 13th loggerhead sea turtle takes on December 7, 2004. The MVN has an incidental take limit of 15 loggerhead sea turtles. Initially, all but one hopper dredge were released from work in the MR-GO bar channel while two relocation trawlers continued to perform work. A third relocation trawler began was brought into the channel on November 19, 2004, and until December 29, 2004, three relocation trawlers were working in the bar channel with a single hopper dredge. As water temperatures continued their seasonal drop from December 30, 2004, through February 16, 2005, only one relocation trawler was used in conjunction with each hopper dredge working in the bar channel. A maximum of two hopper dredges were simultaneously employed in the MR-GO bar channel during this period.

Initially, the relocation trawler that captured sea turtle carried out the relocation release of that sea turtle. Because hopper dredges continued to work while a relocation trawler was transiting to and from the release site, approximately five miles east of the navigational channel, beginning on December 8, 2004, any sea turtle captured by a relocation trawler was transferred to a crewboat for relocation release. This was done to allow the relocation trawlers to continue their work in front of the hopper dredges with no interruptions for release efforts. A relocation trawling supervisor with approved NMFS certification accompanied each transferred sea turtle to

the relocation release site using this method. From this date until the completion of hopper dredging work on the MR-GO bar channel in February 16, 2005, hopper dredges were not allowed to work without having a relocation trawler working in front of the dredge.

As an experiment to achieve greater efficiency in the trawling process, the relocation trawler REVA ROSE began using modified trawling nets on November 1, 2004. The modifications included the addition of an extra bottom line with rollers to help keep the net moving over the channel bottom with more frequent close contact over an uneven surface. A "tongue" or "bib" also was added to the top of the net's mouth to help raise it more into the water column while operating to better enable capture of sea turtles that attempt to swim up and out of the way of the oncoming net. Following the use of this modified trawl net, a noticeable increase in the REVA ROSE's capture rate was noted. As a result of this increased trawling efficiency, the other relocation trawlers were also outfitted with these modified nets such that, by November 19, 2004, all relocation trawlers were utilizing them.

A total of 77 sea turtles were tagged and relocated. This total includes; 71 loggerheads, 3 Kemp's ridleys, and 3 green sea turtles. Only one sea turtle, a loggerhead, was a relocation recapture (originally captured and tagged on October 11, 2004, and recaptured on December 13, 2004). The majority of relocation captures occurred from early October 2004 through early December 2004. From December 13, 2004, through January 12, 3005, there were no sea turtle relocation captures.

COSTS

The costs incurred in performing the turtle-monitoring program during this MR-GO maintenance work include the costs for equipping and maintaining screens and draghead deflectors on contractor-owned and government-owned dredges, as well as providing NMFS-approved observers and relocation trawling. In addition to the direct costs are District costs for administration and oversight. Costs not included in this discussion are unquantifiable costs associated with decreased dredging efficiency, which may result from the use of the draghead deflectors, and downtime experienced during cleaning of excessively fouled screens. The potential contractors anticipate estimates of these increased costs during the preparation of bids, and there is no way to determine the actual value of these costs. Below is a table depicting the quantifiable costs for this post-Hurricane Ivan maintenance dredging work.

	COST OF MONITORING
WHEELER (Government)	$12,998.00 (observers)
Contract 04-C-0056	$510,250.00 (trawling)
	$50,760.00 (observers)
Contract 04-C-0057	$582,450.00 (trawling)
	$79,140.00 (observers)
TOTAL	**$1,235,598.00**

SEA TURTLE STRANDING AND SALVAGE NETWORK

Throughout this hopper dredging work, coordination was conducted with the Sea Turtle Stranding and Salvage Network (STSSN). There were no reports of stranded turtles that bore injuries consistent with a potential encounter with a hopper dredge.

DISCUSSION and SUMMARY

During this maintenance dredging work, 13 sea turtle incidental takes were recorded: 12 loggerheads and 1 green sea turtle. A total of 77 sea turtles were tagged and relocated: 71 loggerheads, 3 Kemp's ridleys, and 3 green sea turtles. Between September 28, 2004, and November 4, 2004, 2 loggerheads, 1 Kemp's ridley, and 3 unidentified sea turtles were sighted by observers working on the hopper dredges. All but 1 sea turtle incidental take and the majority of relocation captures occurred during the October through early December 2004 period. This was generally the period of warmest water temperatures. The number of hopper dredges working in the MR-GO bar channel also was at its greatest during this period. Incidental take reports and relocation trawling capture reports are provided as an attachment.

A total of seven hopper dredges were employed in this post-Hurricane Ivan maintenance effort in the MR-GO bar channel between September 24, 2004, and February 16, 2005. Multiple dredges were employed simultaneously within the Mile –3.8 to Mile –8.4 MR-GO bar channel reach during most of this maintenance work. Following the December 7, 2004, incidental takes of 2 loggerhead sea turtles (numbers 12 and 13 out of a total of 15 allowed for FY 05), the MVN took steps to further minimize the possibility of incidental sea turtle takes by: 1) limiting the number of hopper dredges working in the bar channel to one, 2) using crewboats instead of trawlers to transport and release trawler-captured sea turtles to enable relocation trawlers to perform trawling work with fewer interruptions; and 3) not allowing a hopper dredge to perform dredging work in the MR-GO bar channel without at least one relocation trawler working in front of the dredge. A second hopper dredge was allowed to work in the bar channel beginning on January 13, 2005, after relocation trawling efforts had produced no sea turtle captures between December 4, 2004, and January 12, 2005.

Water temperatures during this work were within the range of sea turtle tolerances (Figure 2). A general seasonal water temperature pattern of declining temperatures from the fall through the winter emerged. However, there were some unexpected variations as water temperatures increased during late December 2004 through early January 2005. Water temperatures at the start of dredging activities on September 24, 2004, were recorded at 82.0° F (27.7°C). The lowest water temperature was recorded on January 25, (52.0° F (11.1°C)). A green sea turtle was taken on January 26, 2005, when water temperatures (55° F (12.8°C)) reached near their lowest levels of the year.

Pursuant to reasonable and prudent measure No. 13 of the November 2003 Biological Opinion, relocation trawling was initiated for hopper dredging activity on the MR-GO bar channel after 2 loggerhead sea turtle takes within a 24-hour period. Relocation trawling began on October 11, 2004, and was conducted on a 24-hour daily basis during dredging operations. Relocation trawlers performed work in the MR-GO bar channel in different trawler-to- hopper

dredge combinations depending upon the prevailing needs and circumstances. From October 11, 2004, through November 18, 2004, two relocation trawlers performed work in the MR-GO bar channel. Trawling work during this period was conducted in association with 2 to 4 hopper dredges simultaneously working in the Mile –3.6 to Mile –8.0 reach. Because of the number of hopper dredges simultaneously working in this MR-GO reach, it was decided that only 2 relocation trawlers would be utilized for safety reasons.

A third relocation trawler began was brought into the channel on November 19, 2004, and until December 29, 2004, three relocation trawlers were working in the bar channel with a single hopper dredge. As water temperatures continued their seasonal drop from December 30, 2004, through February 16, 2005, only one relocation trawler was used in conjunction with each hopper dredge working in the bar channel. A maximum of two hopper dredges were simultaneously employed in the MR-GO bar channel during this period.

As an experiment to achieve greater efficiency in the trawling process, the relocation trawler REVA ROSE began using modified trawling nets on November 1, 2004. Following the use of this modified trawl net, a noticeable increase in the trawler's capture rate was noted. As a result of this increased trawling efficiency, the other relocation trawlers also were outfitted with these modified nets such that, by November 19, 2004, all relocation trawlers were utilizing them.